Amendments to the Specification

Please amend the paragraph starting on page 13, line 13 as follows:

FIG. 1 exhibits another embodiment of the invention, which employs a laser and a lens ~~14~~ **13** to direct optical energy into a cloud of discrete particles produced by the atomizer ~~12~~ **12**. This optical energy propels the particles in a desired direction of flight.

Please amend the paragraph starting on page 17, line 6 as follows:

FIG. 2 is a schematic illustration of an alternative embodiment of the invention, which includes a hollow core optical fiber **19**. The invention has the following features:

Small droplets (~1 μm);

Dense aerosols (~10^{16} m^3);

Accuracy to 3 μm;

Single particle to 10^9 particles/s;

Throughput to 0.25 mm^3/s;

Low power (~ 50 mW);

High scan rate (~1 m/s);

Dense, conductive materials (ρ~2x bulk).

Please amend the paragraph starting on page 17, line 8 as follows:

FIG. 3 reveals some details of an aerosol chamber **20**, which is used to create discrete particles of a source material. Ultrasonic transducer **22** atomizes material **10** in aerosol chamber **20**. Aerosolized particles of material **10** are then entrained in gas flow **24** and forced out of aerosol chamber **20** by gas flow **24**, preferably to the delivery system. Gas flow **24** optionally comprises air. Some features of the aerosol chamber of the present invention include:

Small droplets (~1 μm, 1 fL);

Dense aerosols (~10^{16} m^3);

100 μL minimum sample;

All solids, all precursors, or solid/precursor mixtures;

Precursor based alloys with atomic scale mixing;

Organic and biological entities in droplets (enzymes, proteins, virus, etc.).

Please amend the paragraph starting on page 17, line 10 as follows:

FIG. 4 portrays a compressed air ~~jet.~~ jet **26** having the following features:

Particulate in Suspension;

Large Particles (1-30 μm);

High Viscosity Fluids;

Particles + Precursor binder;

Animal Cells + Media;

Bacteria;

Virus.

Please amend the paragraph starting on page 17, line 11 as follows:

FIG. ~~5 offers another view of~~ 5(a) depicts a schematic for one of the preferred embodiments of the invention. In this embodiment, particle laden air **50** enters deposition head **55** through ports **56**, **58**. Sheath air **60** enters through ports **62**, **64** to surround particle laden air **50**. The air/particle stream then is narrowed as it passes through nozzle **66**. Coflowing air **70** then surrounds the stream, forming jet **72** which impinges on substrate **80**. Laser beam **85** passes through lens **90** and glass window **92** for processing the particles in jet **72** or on substrate **80**. FIG. 5(b) depicts a computer simulation of particle flow for an alternative embodiment in which the particle laden air enters the deposition head through ports in the side of the deposition head.

Please amend the paragraph starting on page 18, line 7 as follows:

Cascade Impaction

Cascade impaction is a method which may be used to sort larger particles from smaller ones. FIG. 6 presents a pictorial description of the cascade impaction method. A gas stream **100** is produced to carry particles of material of varying size and mass. This gas stream is projected through a nozzle **110** towards an impaction plate **120**. In a steady state condition, the gas produces streamlines above the impaction plate. Particles with larger mass and greater momentum are projected through these streamlines, and strike the impaction plate directly at impaction point **130**. These particles accumulate on the surface of the impaction plate. Particles with smaller mass and less momentum are carried in the streamlines, and generally do not strike the impactor plate. These smaller particles continue to travel in the gas stream **132, 134**, commonly know as the "major flow."

Please amend the two paragraphs starting on page 19, line 3 as follows:

Virtual Impaction

~~The larger particles may be utilized by employing virtual impaction. Virtual impaction uses the same principles as cascade impaction, except that an orifice allows the larger particles to continue down stream.~~

FIG. 7 supplies a schematic view of a virtual impactor. <u>Virtual impaction uses the same principles as cascade impaction, except that an orifice **140** allows the larger particles to continue down stream in a "minor flow" **150**.</u> The fundamental difference between a cascade and virtual impactor is that the larger particles are preserved in the gas stream using the virtual impactor. <u>Thus the larger particles may be utilized by employing virtual impaction.</u>

Please amend the paragraph starting on page 21, line 1 as follows:

Method 1 – A Series of Virtual Impactors

FIG. 8 shows one method of densifying the gas stream. The first method involves placing a number of virtual impactors in series to strip off the excess gas. The first impactor strips off both carrier gas and the smaller particles. <u>After minor flow **150** is passed through second nozzle **160**, the</u> ~~The~~ second virtual impactor (and any number after) strips off only carrier gas <u>in second major flow **170**, **172** while the larger particles flow through second orifice **180**</u>. In this method, a series of virtual impactors can be used to densify the gas stream by stripping off more and more of the carrier gas.

Please amend the paragraph starting on page 21, line 8 as follows:

Method Two – Particle Sorting at the Atomizing Unit

FIG. 9 shows a second method to ~~density~~ densify the gas stream. This method employs a virtual impactor (not shown) at the exit of the atomizing unit. This impactor would be used to sort the particle stream prior to introduction into the gas stripping virtual impactors[[.]] so that only large particles remain entrained in entering particle/gas stream **182**. FIG. 9 depicts two air-stripping virtual impaction stages. The first stage comprises nozzle **184**; only carrier gas is removed in first major flow **186**. Initially densified particle/gas stream **187** then passes through first orifice **188** and second nozzle **190**, after which more carrier gas is stripped off in second major flow **192**. Further densified particle/gas stream **194** then passes through second orifice **196**. Both major flows strip off carrier gas only; no particles are removed from the particle/gas streams. Essentially, all of the particles in the gas stream would be sized to permit a direct pass through each gas stripping virtual impaction stage.

Please amend the paragraph starting on page 23, line 22 as follows:

This embodiment starts with the circuit designers CAD file. Proprietary software algorithms are used to translate the *.dxf CAD directly to a machine tool path. The next step is the deposition process where metal or ceramic inks, particulate suspensions, or commercial pastes are aerosolized and then focused into a deposition flow stream and onto a substrate as shown in FIG. 10. FIG. 10 reveals one embodiment of a Flow Guided Deposition System, in which liquid inks and pastes are atomized to form a dense aerosol of droplets and particulates. The aerosols are entrained in a gas flow and fed into a proprietary deposition head **200**. The co-flowing sheath gas creates the aerodynamic forces to focus the aerosol stream. Finally, the streams are directed through nozzle **210** onto a substrate and mesoscale devices directly written. The current line width capability is down to about 25 microns, and the thickness capability is up to 100's of microns.

Please amend the paragraph starting on page 25, line 16 as follows:

Flow-Guided Deposition

The output mist is entrained in a gas flow (aerosol stream), and is fed into the flow-guided deposition head. The mass throughput is controlled by the aerosol carrier gas flow rate. Inside the head, the mist is initially collimated by passing through a millimeter-sized orifice as shown in FIG. 11. FIG. 11 reveals a flow guide head, showing the particle stream, focusing orifice, and the sheath gas flow. The aerosol stream **300** passes through an initial orifice **310** serving as the primary focusing point. Then the sheath gas **320** is annularly fed around the aerosol stream and fed through a second orifice **330**, preferably sub-millimeter sized, thus focusing the stream further. ~~The emergent particle stream is then mixed with an annular sheath gas, and the combined streams are focused through a second, sub-millimeter sized orifice.~~